

**CLAIMS**

1           1.       A method comprising:  
2           forming a trench in a substrate;  
3           providing at least one metalized surface along said trench; and  
4           applying a bonding surface having a metalized capping surface to said substrate such that said  
5 metalized capping surface is located over said trench having said at least one metalized surface so as  
6 to form a waveguide structure.

1           2.       The method of claim 1, wherein said substrate comprises a printed circuit board.

1           3.       The method of claim 1, wherein said substrate comprises a dielectric material.

1           4.       The method of claim 3, wherein said trench is formed by selectively removing portions  
2 of said dielectric material.

1           5.       The method of claim 1, wherein said at least one metalized surface comprises sidewall  
2 surfaces and a bottom surface of said waveguide structure.

1           6.       The method of claim 1, wherein said metalized capping surface on said bonding  
2 surface is formed by applying a metal coating on said bonding surface and selectively removing  
3 portions of said metal coating such that said metalized capping surface remains on said bonding  
4 surface.

1           7.       The method of claim 1, wherein said metalized capping surface on said bonding  
2 surface is formed by providing said bonding surface and selectively placing said metalized capping  
3 surface on said bonding surface.

1           8.       The method of claim 1, further comprising filling said trench with a material.

1           9.       A method comprising:  
2           forming a trench in a printed circuit board substrate, said trench having a first side surface, a  
3 second side surface and a bottom surface;  
4           forming at least one surface on said first side surface, said second side surface and said  
5 bottom surface of said trench; and  
6           forming a top surface over said trench having said at least one surface.

1           10.      The method of claim 9, wherein said at least one surface comprises at least one  
2 metalized surface and said top surface comprises a top metalized surface.

1           11.      The method of claim 10, wherein said substrate comprises a dielectric material.

1           12.      The method of claim 11, wherein said trench is formed by selectively removing portions  
2 of said printed circuit board substrate.

1           13.      The method of claim 11, wherein forming said top metalized surface over said trench  
2 comprises affixing a bonding surface having a metalized capping surface to said printed circuit board

3 substrate.

1 14. The method of claim 13, wherein said top metalized surface on said bonding surface  
2 is formed by applying a metal coating on said bonding surface and selectively removing portions of said  
3 metal coating such that said top metalized surface remains on said bonding surface.

1 15. The method of claim 13, wherein said top metalized surface on said bonding surface is  
2 formed by providing said bonding surface and selectively aligning said top metalized surface on said  
3 bonding surface.

1 16. The method of claim 9, further comprising filling said trench with a material.

1 17. A method comprising:  
2 forming a trench in a printed circuit board; and  
3 forming a waveguide structure in said trench of said printed circuit board, said waveguide  
4 structure having at least one metalized surface.

1 18. The method of claim 17, wherein said trench comprises a first sidewall, a second  
2 sidewall and a bottom wall.

1 19. The method of claim 18, wherein said waveguide structure comprises said at least one  
2 metalized surface on said first sidewall, said second sidewall and said bottom wall and a metalized  
3 surface on a top of said trench.

1           20.     The method of claim 17, wherein said waveguide structure is formed by providing at  
2     least one metalized surface along said trench, and bonding a bonding surface having a metalized  
3     capping surface to said printed circuit board such that said metalized capping surface is located over  
4     said trench having said at least one metalized surface so as to form said waveguide structure.

1           21.     The method of claim 17, further comprising filling said trench with a material.

1           22.     A structure comprising:  
2     a printed circuit board;  
3     bonding material provided on at least one surface of said printed circuit board; and  
4     a waveguide structure provided within said printed circuit board.

1           23.     The structure of claim 22, wherein said printed circuit board comprises a trench formed  
2     within said printed circuit board between a top surface of said printed circuit board and a bottom surface  
3     of said printed circuit board.

1           24.     The structure of claim 23, wherein said trench comprises a first sidewall, a second  
2     sidewall and a bottom wall.

1           25.     The structure of claim 24, wherein said waveguide structure comprises at least one  
2     metalized surface on said first sidewall, said second sidewall and said bottom wall and a metalized  
3     capping surface on a top of said trench and adjacent said bonding material.

26. The structure of claim 23, wherein said trench is filled with a material.